WHAT IS CLAIMED IS:

1. A hydraulic control system for a belt-drive continuously variable transmission (CVT) of a vehicle, the CVT including a belt, the hydraulic control system comprising:

an oil pump operative to produce an oil pressure and an oil flow amount which are supplied to the CVT;

a pressure regulator valve operative to regulate the oil pressure produced by the oil pump;

a belt lubricating oil supply passage for supplying oil to the belt on a downstream side of the pressure regulator valve;

engine operating condition detecting means for detecting an engine operating condition and generating a signal indicative of the engine operating condition detected; and

a controller for controlling the oil flow amount based on the signal, the controller being programmed to:

calculate a CVT input torque based on the signal;

calculate a required belt lubricating oil flow amount to be supplied to the belt on the basis of the signal and the CVT input torque;

determine a minimum speed of the oil pump based on the required belt lubricating oil flow amount; and

control the oil pump at the minimum speed.

2. The hydraulic control system as claimed in claim 1, wherein the engine operating condition detecting means comprises an oil temperature sensor operative to detect a temperature of the oil in the CVT and generate an oil temperature signal indicative of the oil temperature detected.

3. The hydraulic control system as claimed in claim 1, wherein the engine operating condition detecting means

comprises a throttle position sensor operative to detect a throttle opening degree and generate a throttle opening degree signal indicative of the throttle opening degree detected.

4. The hydraulic control system as claimed in claim 2, wherein the CVT includes a primary pulley, the hydraulic control system further comprising primary pulley speed detecting means for detecting rotational speed of the primary pulley and generating a primary pulley speed signal indicative of the rotational speed detected, the controller receiving the primary pulley speed signal, the controller being programmed to calculate the required belt lubricating oil flow amount based on at least one of the CVT input torque and the primary pulley speed signal when the oil temperature is not less than a predetermined value.

5. The hydraulic control system as claimed in claim 4, wherein the CVT includes a secondary pulley, the hydraulic control system further comprising secondary pulley speed detecting means for detecting rotational speed of the secondary pulley and generating a secondary pulley speed signal indicative of the rotational speed detected, the controller receiving the secondary pulley speed signal, the controller being programmed to:

calculate a pulley speed ratio between the rotational speed of the primary pulley and the rotational speed of the secondary pulley; and

calculate the required belt lubricating oil flow amount based on at least one of the CVT input torque, the primary pulley speed signal and the pulley speed ratio when the oil temperature is not less than a predetermined value.

6. The hydraulic control system as claimed in claim 2, further comprising an oil cooler disposed on a downstream side of the pressure regulator valve, a lubricating oil supply path for supplying the oil to lubrication parts in the CVT, the lubricating oil supply path being disposed on a downstream side of the oil cooler and including the belt lubricating oil supply passage, and line pressure detecting means for detecting a line pressure between the oil pump and the pressure regulator valve and generating a line pressure signal indicative of the line pressure detected, the controller receiving the line pressure signal, the controller being programmed to:

calculate a required cooler oil flow amount to be supplied to the oil cooler from the required belt lubricating oil flow amount on the basis of a predetermined oil distribution ratio of an oil flow amount to be supplied to the belt lubricating oil supply passage to an oil flow amount to be supplied to the lubricating oil supply path;

calculate a cooler input pressure to be supplied to the oil cooler on the basis of the required cooler oil flow amount; and

determine the minimum speed of the oil pump based on the cooler input pressure, the oil temperature signal and the line pressure signal.

7. The hydraulic control system as claimed in claim 5, wherein the CVT has a manual transmission mode allowing to manually change the pulley speed ratio, the hydraulic control system further comprising transmission mode detecting means for detecting that the CVT is in the manual transmission mode and generating a manual mode signal indicative of the CVT in the manual transmission mode, the

controller being programmed, in response to the manual mode signal, to clear the minimum speed of the oil pump.

8. The hydraulic control system as claimed in claim 5, wherein the CVT has a manual transmission mode allowing to manually change the pulley speed ratio and an automatic transmission mode allowing to automatically change the pulley speed ratio, the hydraulic control system further comprising transmission mode detecting means for detecting whether the CVT is in the manual transmission mode or in the automatic transmission mode and generating a manual mode signal indicative of the CVT in the manual transmission mode and an automatic mode signal indicative of the CVT in the automatic transmission mode, the controller being programmed, in response to the manual mode signal, to set the minimum speed of the oil pump larger than in the automatic transmission mode.

9. The hydraulic control system as claimed in claim 1, wherein the vehicle includes an anti-lock brake system (ABS) actuator operative to control a braking pressure, an ABS control unit for generating an ABS control signal to the ABS actuator, and an ABS control sensor operative to detect the ABS control signal and generate an ABS control ON signal indicative of ABS control being conducted, the controller being programmed, in response to the ABS control ON signal, to clear the minimum speed of the oil pump.

10. The hydraulic control system as claimed in claim 6, wherein the belt lubricating oil supply passage comprises a belt lubricating nozzle for injecting the oil to the belt, the lubricating oil supply path comprising a gear

lubricating nozzle for injecting the oil to a differential gear.

11. A method for controlling a belt-drive continuously variable transmission (CVT) of a vehicle, the CVT including a belt, the vehicle including an oil pump operative to produce an oil pressure and an oil flow amount which are supplied to the CVT, a pressure regulator valve operative to regulate the oil pressure produced by the oil pump, and a belt lubricating oil supply passage for supplying oil to the belt on a downstream side of the pressure regulator valve, the method comprising:

generating an engine operating condition signal indicative of an engine operating condition;

calculating a CVT input torque based on the engine operating condition signal;

calculating a required belt lubricating oil flow amount to be supplied to the belt on the basis of the engine operating condition signal and the CVT input torque;

determining a minimum speed of the oil pump based on the required belt lubricating oil flow amount; and

controlling the oil pump at the minimum speed.

12. The method as claimed in claim 11, wherein the engine operating condition signal comprises an oil temperature signal indicative of a temperature of the oil in the CVT, the required belt lubricating oil flow amount being calculated based on the oil temperature signal.

13. The method as claimed in claim 11, wherein the engine operating condition signal comprises a throttle opening degree signal, the CVT input torque being calculated based on the throttle opening degree signal.

14. The method as claimed in claim 12, wherein the CVT includes a primary pulley, the method further comprising generating a primary pulley speed signal indicative of a rotational speed of the primary pulley, and calculating the required belt lubricating oil flow amount based on at least one of the CVT input torque and the primary pulley speed signal when the oil temperature is not less than a predetermined value.

15. The method as claimed in claim 14, wherein the CVT includes a secondary pulley, the method further comprising:

generating a secondary pulley speed signal indicative of a rotational speed of the secondary pulley;

calculating a pulley speed ratio between the rotational speed of the primary pulley and the rotational speed of the secondary pulley; and

calculating the required belt lubricating oil flow amount based on at least one of the CVT input torque, the primary pulley speed signal and the pulley speed ratio when the oil temperature is not less than a predetermined value.

16. The method as claimed in claim 12, wherein the vehicle includes an oil cooler disposed on the downstream side of the pressure regulator valve and a lubricating oil supply path for supplying the oil to lubrication parts in the CVT, the lubricating oil supply path being disposed on a downstream side of the oil cooler and including the belt lubricating oil supply passage, the method further comprising:

generating a line pressure signal indicative of a line pressure between the oil pump and the pressure regulator valve;

calculating a required cooler oil flow amount to be supplied to the oil cooler from the required belt lubricating oil flow amount on the basis of a predetermined oil distribution ratio of an oil flow amount to be supplied to the belt lubricating oil supply passage to an oil flow amount to be supplied to the lubricating oil supply path;

calculating a cooler input pressure to be supplied to the oil cooler on the basis of the required cooler oil flow amount; and

determining the minimum speed of the oil pump based on the cooler input pressure, the oil temperature signal and the line pressure signal.

17. The method as claimed in claim 15, wherein the CVT has a manual transmission mode allowing to manually change the pulley speed ratio, the method further comprising:

generating a manual mode signal indicative of the CVT in the manual transmission mode; and

clearing, in response to the manual mode signal, the minimum speed of the oil pump.

18. The method as claimed in claim 15, wherein the CVT has a manual transmission mode allowing to manually change the pulley speed ratio and an automatic transmission mode allowing to automatically change the pulley speed ratio, the method further comprising:

generating a manual mode signal indicative of the CVT in the manual transmission mode and an automatic mode signal indicative of the CVT in the automatic transmission mode; and

setting, in response to the manual mode signal, the minimum speed of the oil pump larger than in the automatic transmission mode.

19. The method as claimed in claim 11, wherein the vehicle includes an anti-lock brake system (ABS) actuator operative to control a braking pressure and an ABS control unit for generating an ABS control signal to the ABS actuator, the method further comprising:

generating an ABS control ON signal indicative of ABS control being conducted; and

in response to the ABS control ON signal, clearing the minimum speed of the oil pump.

20. The method as claimed in claim 16, wherein the belt lubricating oil supply passage comprises a belt lubricating nozzle for injecting the oil to the belt, the lubricating oil supply path comprising a gear lubricating nozzle for injecting the oil to a differential gear.